Space Weather Forecast

Issued on Sunday, 02 October 2022 at 01:12 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor to Moderate storming possible into Day 3 (04 Oct). M-class flares Likely throughout. Chance of S1/Minor radiation storm during Day 1 (02 Oct).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the last 24 hours, with an Moderate-class flare observed at 01/2010 UTC, from a region in the northwest. This region has developed a north-south aligned magnetic structure, which may contribute to some magnetic instability. The region which continues to rotate into view on the northeast limb is the largest region. It is currently difficult to classify due to foreshortening near the limb, but it has been the source of several Coronal Mass Ejections (CMEs) over recent days. There are currently six numbered sunspots on the Earth-facing disc. The remaining regions appear largely stable with little change.

Two CMEs have been observed from the northwest quadrant, one in association with the recent flare. Both are still undergoing analysis but some Earth directed component is possible from each of them.

Solar Wind / Geomagnetic Activity: Solar wind parameters are indicative of an ongoing weak coronal hole fast wind, with a weak CME arrival at 01/1505 UTC. Wind speeds were slightly elevated, mostly in the range 400-500km/s. The total interplanetary magnetic field was weak, jumping to moderate when the CME arrived. The north-south component varied weakly. Geomagnetic activity was Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is currently just above normal background levels, below the S1/Minor Storm threshold.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be Low to Moderate, with further Moderate-class flares likely from the large region in the northeast and the two regions in the northwest.

Solar Wind / Geomagnetic Activity: Two CMEs have erupted from the northwest quadrant in recent hours. Both are still being analysed, and may glance Earth. Arrival times are uncertain at present, but late Day 2 or early Day 3 (03-04 Oct) currently seems most likely. Solar winds are slightly elevated and on a steady trend. A further increase is likely due to a recurrent coronal hole. There is some uncertainty though due to Enlil suggesting a slower arrival of the fast wind. Solar winds are still considered likely to rise during Day 1 (02 Oct), with a peak of 600-700km/s. Geomagnetic activity will be Quiet initially, before increasing to Active to G1/Minor storm (Kp 4-5) as the fast wind arrives, with a chance of G2/Moderate storm levels (Kp 6). There is also just a slight chance of an isolated G3/Strong storm (Kp 7) interval. Enhanced conditions may be continued into Day 3 if either of the recent CMEs arrive. Geomagnetic activity perhaps starting to ease during Day 4 (05 Oct).

Energetic Particles / Solar Radiation: The count rate of energetic particles is currently above background after the recent Moderate flare from the northwest. There is a chance proton levels will breach the S1/Minor Storm threshold during Day 1 (02 Oct), with a gradual decrease likely thereafter in the absence of further large flares from the western hemisphere.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	60	40	40	10
Strong	G3	No	10	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	30	20	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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